

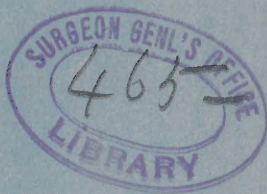
HAWKES (J. M.)

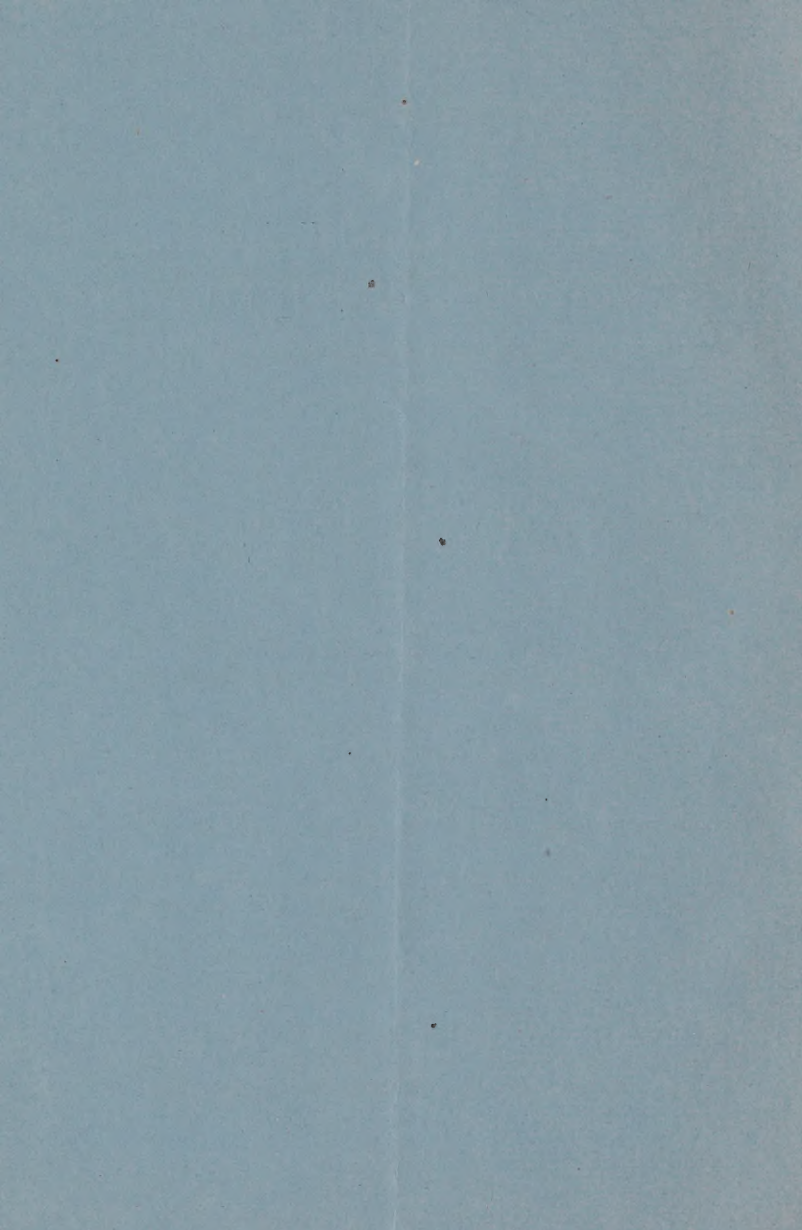
INJURY TO THE SPINE: INVENTION AND
APPLICATION OF PAPER JACKET.

BY

J. MARSHALL HAWKES, M.D.,
OF NEW YORK CITY.

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***INJURY TO THE SPINE: INVENTION AND
APPLICATION OF PAPER JACKET.***

BY J. MARSHALL HAWKES, M.D.,
OF NEW YORK CITY.

In the early part of 1887, Ada G., aged twenty-three years, having received a fall, began to suffer from pain in the vicinity of the third lumbar vertebra. Later, the pain at times became so violent that she could neither stand nor sit, but was obliged to maintain the recumbent position. It did not, however, become continuous until the following autumn, when she became subject to such severe and prolonged attacks as incapacitated her for work.

The attendant physician ordered blisters to be placed transversely across the body of the affected vertebra. For nine weeks this style of treatment was continued, but little relief was obtained and the pain returned in all its severity on the resumption of work.

In May of that year, becoming convinced that she was not improving, she applied to a specialist in electro-therapeutics. For two months electricity was applied, but again the patient experienced but little relief, and the pain promptly returned on the resumption of work.

In December, ten months after the commencement of her trouble, I was called to see her. Since the ordinary, routine treatment had already been

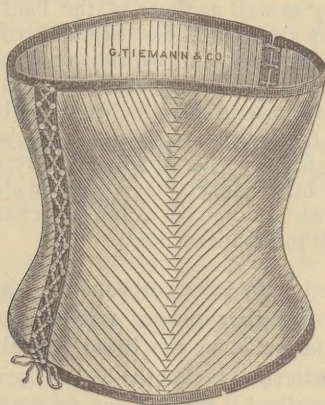


tried, nothing seemed to remain but to remove the superincumbent weight and thus, if possible, relieve the pressure upon the injured vertebra. Accordingly, the patient was suspended by the head and shoulders, when the pain immediately disappeared, but the patient as promptly fainted. It was found impossible to suspend her longer than a few minutes at a time, for several days, but as soon as she could remain suspended a sufficient length of time a plaster jacket was made. On its application the pain immediately ceased, but the patient constantly complained of the weight and the discomfort of the plaster jacket. Besides, after a few days, the disintegrating plaster began to sift down through her clothing, the odor of accumulating perspiration became very disagreeable, and the jacket itself grew loose and did not properly support the weight of the upper part of the body.

Finding it necessary, for the reasons stated, to supply something lighter, felt, leather, silicate of soda bandages, wood, mickelled electroplate, etc., were successively tried, but each had its serious and irremediable objections. Without entering into tiresome and useless details, they were all either hot, heavy, cumbersome, conspicuous, expensive, or difficult to prepare, etc. While in this quandary as to what to make, a paper shell, such as is used by professional oarsmen, furnished the needed suggestion. Surely, if paper could be used to make a pail, pan, car-wheel, or a boat, it certainly appeared to be an appropriate substitute for the materials in use for spinal supports. Accordingly, a mould of the patient's body was made by winding wet plaster bandages around the body, from the anterior superior spinous processes of the ilia to near the lower borders of the axillæ, while the patient was suspended, with the pelvis fixed.

A plaster cast, made from the mould, was so modelled as to preserve the natural anatomical contour of the patient. Upon this cast, paper of various styles, weights, and qualities, cut into strips half an inch in width, were laid in successive layers, running in various directions, by means of glue, cement, shellac, and many other compounds, until, after a long series of very discouraging experiments, a jacket of pure jute fiber, free from clay and wood-pulp, was finally produced which the accompanying cut very excellently represents.

FIG. I.



The ideal paper jacket.

This appliance was no sooner fitted to the patient than all her objections to the use of a spinal support vanished. It was neat, cleanly, thin, light, strong, inconspicuous, readily removable, and comfortable to the wearer. Only one thing more was necessary. It must be capable of

expansion during respiration, and yet immediately contract and not lose its hold on the thorax during expiration. This requirement was met by dividing the jacket into two parts on the axillary lines, and lacing them together with an elastic lacing. This was done and the jacket seemed to meet every reasonable demand.

The patient was ordered to remove the jacket at night on retiring, and *not* to put it on in the morning till the spinal column had been thoroughly extended by suspension after the method already described. She was also given a thorough training in light gymnastics to strengthen *all* the other muscles of the body as well as those of the back. The result was very gratifying. She experienced immediate relief from the pain, and within two weeks returned to her work in a millinery establishment, where she has ever since remained. As her shape has changed somewhat from time to time, other jackets have been made for her with equally good results. Since then many other jackets have been made for other patients with lesions of a similar character, and always with the same success.

Compared with other orthopedic appliances intended to furnish a proper support for the spine when the lesion is in the lower dorsal or lumbar region, I believe that for the following reasons the method described is the best yet devised:

1. It is the thinnest, lightest, and strongest jacket, furnishing sufficient support, ever made. Though its average weight is only about twelve ounces, and its average thickness less than three thirty-seconds of an inch, yet it is able to sustain a weight of over two hundred pounds.

2. It is impervious to moisture; hence, does not

absorb perspiration, and consequently does not become unbearable to the wearer.

3. A lady can wear it in place of the ordinary corset without "letting out" her dresses or making any changes in her ordinary wearing apparel.

4. The most muscular laborer engaged in the severest kind of manual labor finds it capable of sustaining any necessary strain.

5. It furnishes a more convenient, efficient, and durable support for the jury-mast, shoulder-brace, abdominal supporter, truss, leg-brace, etc., than any other kindred appliance.

6. It does not disintegrate and soil the clothing like plaster, or rust out like "alloy wire," or soften like felt.

7. It affords a solid base from which to furnish direct pressure to remedy any existing or developing deformity, yet accommodates itself to the action of the muscles of respiration.

8. It can be easily modelled to fit any exaggeration of anatomical contour, and can be ventilated by means of eyelets to any extent.

9. It is practically indestructible. The patient can never wear it out.

10. Its cost is no more than that of any other first-class appliance.

Soon after perfecting the paper jacket, I extended the application of paper to the making of splints. The result was as gratifying as in the case of the jacket.

The preparation and use are best illustrated by the following case :

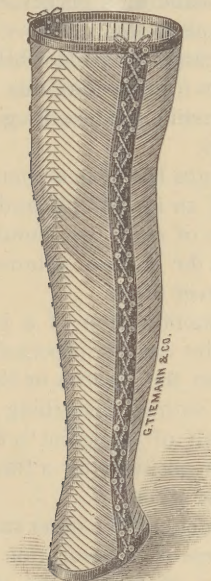
On September 9, 1891, Carl W., nine years of age, while playing in the street, was run over by a heavy wagon and sustained a double compound comminuted fracture of the right leg. I saw the patient within a few minutes after the accident. No important vessels or nerves were injured, and after the usual antiseptic dressing had been applied, the leg was put up in a Levis splint (nickelled electroplate). In four days, the swelling having subsided, a plaster bandage was applied, immobilizing both knee and ankle, but leaving a fenestra over the seat of the injury.

Several difficulties immediately presented themselves: the joints could not be immobilized for an indefinite time without fear of ankylosis; the plaster bandage could not be removed to make passive motion of the joints without great trouble and danger of displacement of the bones; the limb could not be bathed and the accumulating scales of epidermis removed, for a similar reason; the wound could not be re-dressed without the disintegrating plaster falling into it, unless much precaution was used.

Indeed, the annoyance became so great that I decided to make a splint of paper on the same general plan as had been used in the construction of the paper jacket. Accordingly, a shallow box, with adjustable sides and ends, was made ready, and filled half-full of prepared plaster. Into this plaster the limb—nude, shaved, oiled, and thoroughly extended—was lowered, until the plaster covered the lower or posterior half of the limb. As soon as the plaster set, a brush filled with melted paraffin was passed over it. Over this enough plaster was poured to cover the limb. As soon as the plaster had set, the sides and ends of the box were let down, the upper half of the mould was removed, and the leg

was carefully lifted out of the lower half. The whole time occupied was less than fifteen minutes. The upper half of the mould was returned to its place, the box restored, and a perfect mould of the

FIG. 2.



The ideal paper splint.

limb was thus made ready. A cast made from the mould was used as a model on which to lay the paper for the splint. The accompanying cut represents the splint after it had been cut from the cast and bound. Hooks were inserted in both sides of the splint.

As soon as this splint was adjusted to the limb, the disadvantages of plaster were more readily apparent. After using it for ten weeks in one of the worst fractures that I have ever seen, the following points of superiority were demonstrated :

1. Since it is made on a plaster cast of the limb itself, it must fit perfectly.

2. Since the cast was made while the limb was fully extended, it follows that this position of extension will be maintained as long as the splint is carefully adjusted.

3. Since it weighs less than a pound, is only three thirty-seconds of an inch thick, and yet is able to sustain a weight of over two hundred pounds, it follows that it is the lightest, thinnest, and yet the strongest splint ever made.

4. Perfect immobilization of a joint can be secured, yet the joint can be inspected at a moment's notice, since either the anterior or the posterior half can be removed without disturbing the other, and because either half of the splint is able to keep the limb in its proper position, for a limited time, without the aid of the other.

5. Both the outer and the inner surfaces are waterproof ; hence there is no absorption of perspiration, no odor, no fear of getting the splint wet while bathing or dressing the limb.

6. It offers no obstacle to making passive motion of the joints at any time, since by removal of the posterior half the knee can be flexed or the foot extended at will without fear of displacement.

7. In compound fractures it simply becomes necessary to remove that half of the splint which

covers the wound, and irrigate and dress it, with the confident assurance that the other half will hold the limb securely.

8. During the period of convalescence the patient can wear his usual clothing over the splint.

9. The uniform pressure checks muscular spasm and lessens the tendency to swelling and edema.

10. There is no great difficulty to be overcome in the preparation of these splints, and any first-class instrument-maker should be able to furnish them with facility.

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